WHAT IS CLAIMED IS:

1.   A structure editing apparatus wherein an appropriate data range in arranged data is defined as a segment and, when the data range defined by one segment is expressed by a group of a plurality of other segments, said group of the plurality of other segments is defined as a package, thereby editing a structure of said arranged data using structure information defining a hierarchical structure of said arranged data, said structure editing apparatus comprising:

first designating unit which designates an arbitrary segment in said structure information as a target segment;

second designating unit which designates an arbitrary position included in a range of said target segment; and

segment dividing unit which divides the range of said target segment into a first half segment and a second half segment at a dividing position, the dividing position being said position designated by said second designating unit.

2.   A structure editing apparatus according to claim 1, wherein when said target segment has a package, said segment dividing unit divides the package into a first half package consisting of a segment corresponding to a range of said first half segment and a second half package consisting of a segment corresponding to a range of said second half segment.

3. A structure editing apparatus according to claim 1, wherein said first designating unit is constituted out of a display unit displaying said structure information and a pointing device for designating the target segment, and said second designating unit is constituted out of the display unit displaying said structure information and a pointing device for designating said dividing position; and

said second designating unit displays a line segment for indicating the dividing position on said target segment displayed and freely translating a position of the line segment using the pointing device of said second designating unit.

4. A structure editing apparatus according to claim 1, comprising:

third designating unit which designates movement of one of a boundary on a side of a start position of said target segment and a boundary on a side of an end position of said target segment when an end position of a segment right before said target segment is equal to the start position of the target segment and the end position of the target segment is equal to a start position of a segment right after the target segment; and

segment boundary moving unit which moves the designated boundary on one of the sides of the start position and the end position with said position designated by said second designating unit set as a moving position when said third designating unit designates

the movement of the boundary.

5.   A structure editing apparatus according to claim 4, wherein
when said boundary is to be moved, said segment boundary
moving unit can select one of three boundary movement processings,
the three boundary movement processings being:

a first boundary movement processing for moving only one
of the start position and the end position of said target segment
without changing one of the start position of the segment right
after the target segment and the end position of the segment right
before the target segment;

a second boundary movement processing for moving one of the
start position and the end position of said target segment, and
moving one of the end position of the segment right before the target
segment and the start position of the segment right after the target
segment in contact with one of the start position and the end position
of said target segment; and

a third boundary movement processing for moving only one
of the start position and the end position of said target segment
without moving one of the start position of the segment right after
the target segment and the end position of the segment right before
the target segment, and inserting a new segment to fill a generated
clearance.

6. A structure editing apparatus according to claim 5, wherein when said target segment has a package, said segment boundary moving unit moves a boundary of a segment in the package in accordance with the range of the target segment.

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7. A structure editing apparatus according to claim 6, wherein said second designating unit displays a line segment for indicating the moving position on said target segment displayed, and freely translating a position of the line segment using the

10 pointing device.

8. A structure editing apparatus according to claim 1, wherein when said target segment has a structural element below a package in a lower hierarchy, one of a first cutting processing

15 for deleting a structural element below a segment to be cut, a second cutting processing for dividing the segment to be cut, and a third cutting processing for dividing the segment to be cut and then merging divided segment parts with two segments adjacent the divided segment is selectable as a processing for cutting a descendent segment by

20 one of said segment dividing unit and said segment boundary moving unit, respectively, the first cutting processing, the second cutting processing and the third cutting processing recursively applied up to an end descendant.

9.   A structure editing apparatus according to claim 1, further comprising:

fourth designating unit which designates segment merger; and

segment merging unit which merges a plurality of segments and replacing the plurality of segment by one segment, wherein said first designating unit can designate a plurality of adjacent segments in a same package as target segments; and

when said first designating unit designates the plurality of target segments and said fourth designating unit designates the segment merger, then said segment merging unit mergers the designated plurality of target segments and replaces a start position of a first segment to an end position of an end segment on basis of time series by one segment.

10.   A structure editing apparatus according to claim 1, further comprising:

fifth designating unit which designates an arbitrary package in said structure information as a target package; and

a package hierarchy upgrading unit which replaces a segment above said target package by all segments serving as structural elements of said target package and upgrading said target package by one hierarchy when said fifth designating unit designates the target package.

11.   A structure editing apparatus according to claim 1, further comprising:

sixth designating unit which designates segment hierarchy downgrading; and

5   a segment hierarchy downgrading unit which creates a new package and a new segment out of a plurality of segments, arranging said new segment in place of said plurality of segments, and arranging said new package in a hierarchy below said new segment, wherein

said first designating unit can designate a plurality of 10   adjacent segments in a same package as target segments;

when said first designating unit designates the plurality of target segments and said sixth designating unit designates the segment hierarchy downgrading, then said segment hierarchy downgrading unit creates, as said new segment, a segment in a range 15   corresponding to a combined range of said plurality of target segments, replaces said plurality of target segment by the new segment, creates the new package below the new segment, and moves said plurality of target segments below the new package.

20   12.   A structure editing apparatus according to claim 1, further comprising:

seventh designating unit which designates segment hierarchy upgrading; and

segment hierarchy upgrading unit which moves a plurality 25   of segments to a hierarchy of a segment higher than the plurality

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of segments by one hierarchy, wherein

said first designating unit can designate a plurality of adjacent segments in a same package as target segments; and

when said fist designating unit designates the plurality of target segments and said seventh unit designate the segment hierarchy upgrading, then said segment hierarchy upgrading unit sets a segment above a package including said plurality of target segments as a parent segment, divides said parent segment into a new segment in a range corresponding to a combined range of said plurality of target segments and other segments, and replaces said plurality of target segments by said new segment.

13.   A structure editing apparatus according to claim 1, further comprising:

eighth designating unit which designates segment deletion; and

segment deleting unit which deletes a structural element below said target segment when said eighth designating unit designates the segment deletion.

14.   A structure editing apparatus according to claim 13, wherein as a processing for a clearance generated after said segment deleting unit deletes the structural element below the target segment, one of no post-processing, a first processing for extending a boundary of a segment right before the target segment, a second

processing for extending a boundary of a segment right after the target segment, and a fourth processing for designating one point in a range of the target segment and extending the boundaries of the segments right before and after the target segment toward respective designated positions is selectable.

15.   A structure editing apparatus according to claim 10, further comprising:

ninth designating unit which designates package deletion; and

package deleting unit which deletes a structural element below the target package when said fifth designating unit designates the target package and said ninth designating unit designates the package deletion.

16.   A structure editing apparatus according to claim 1, wherein said arranged data is a picture stream.

17.   A picture structure editing apparatus wherein an arbitrary frame range in a picture stream is defined as a segment, and when the range designated by one segment is expressed by a group of a plurality of other segments, the group of said plurality of segments is defined as a package, thereby editing a structure of said picture stream using structure information defining a hierarchical structure of said picture stream, the picture structure editing

apparatus comprising:

first designating unit which designates an arbitrary segment in said structure information as a target segment;

second designating unit which designates an arbitrary position included in a range of said target segment; and

segment dividing unit which divides the range of said target segment into a first half segment and a second half segment at a dividing position, the dividing position being said position designated by said second designating unit.

18. A picture structure editing apparatus according to claim 17, wherein

when said target segment has a package, said segment dividing unit divides the package into a first half package consisting of a segment corresponding to a range of said first half segment and a second half package consisting of a segment corresponding to a range of said second half segment.

19. A structure editing apparatus according to claim 17, wherein

said first designating unit is constituted out of a display unit displaying said structure information and a pointing device for designating the target segment, and said second designating unit is constituted out of the display unit displaying said structure information and a pointing device for designating said dividing position; and

said second designating unit displays a line segment for indicating a dividing position on said target segment displayed and freely translating a position of the line segment using the pointing device of said second designating unit.

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20.   A picture structure editing apparatus according to claim 19, wherein

when said dividing position is in units of frames, a segment start frame A, a segment end frame B, a division target candidate frame C and a frame D right before the division target candidate frame C are arranged in an order of the frame A, the frame D, the frame C and the frame B and displayed together with the number of frames on an operation dialog.

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15   21.   A picture structure editing apparatus according to claim 20, wherein

when one of the segment division and the segment boundary movement is conducted through one of said segment dividing unit and said segment boundary moving unit, respectively, it is possible to select one of updating only when an update button is depressed and updating at set update timing to display updating of the respective frames displayed on said operation dialog.

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22.   A picture structure editing apparatus according to claim 21, wherein

a reproduction button and a frame candidate select button are provided;

when said reproduction button is depressed, the target segment at a time of depression of said reproduction button is reproduced; and

when said frame candidate select button is depressed, peripheries of a candidate frame designated at a time of depression of said frame candidate select button are displayed on a frame continuous display screen.

23.   A picture structure editing apparatus according to claim 17, comprising:

third designating unit which designates movement of one of a boundary on a side of a start position of said target segment and a boundary on a side of an end position of said target segment when an end position of a segment right before said target segment is equal to the start position of the target segment and the end position of the target segment is equal to a start position of a segment right after the target segment; and

segment boundary moving unit which moves the designated boundary on one of the sides of the start position and the end position with said position designated by said second designating unit set as a moving position when said third designating unit designates

the movement of the boundary.

24.   A picture structure editing apparatus according to claim 23, wherein

when said boundary is to be moved, said segment boundary moving unit can select one of three boundary movement processings, the three boundary movement processings being:

a first boundary movement processing for moving only one of the start position and the end position of said target segment without changing one of the start position of the segment right after the target segment and the end position of the segment right before the target segment;

a second boundary movement processing for moving one of the start position and the end position of said target segment, and moving one of the end position of the segment right before the target segment and the start position of the segment right after the target segment in contact with one of the start position and the end position of said target segment; and

a third boundary movement processing for moving only one of the start position and the end position of said target segment without moving one of the start position of the segment right after the target segment and the end position of the segment right before the target segment, and inserting a new segment to fill a generated clearance.

25.   A picture structure editing apparatus according to claim
24, wherein

when said target segment has a package, said segment boundary
moving unit moves a boundary of a segment in the package in accordance
with the range of the target segment.

26.   A picture structure editing apparatus according to claim
17, wherein

said second designating unit displays a line segment for
indicating the moving position on said target segment displayed,
and freely translating a position of the line segment using the
pointing device.

27.   A picture structure editing apparatus according to claim
26, wherein

when said moving position is in units of frames, a start
frame A of a segment right before the target segment, an end frame
B of the segment right before the target segment, a start frame
C of the target segment, an end frame D of the target segment, a
start frame E of a segment right after the target segment and an
end frame F of the segment right after the target segment are displayed
together with the number of frames on an operation dialog.

28.   A picture structure editing apparatus according to claim
26, wherein

when one of the segment division and the segment boundary
movement is conducted through one of said segment dividing unit
and said segment boundary moving unit, respectively, it is possible
to select one of updating only when an update button is depressed
and updating at set update timing to display updating of the
respective frames displayed on said operation dialog.

29.   A picture structure editing apparatus according to claim
28, wherein

a reproduction button and a frame candidate select button
are provided;

when said reproduction button is depressed, the target
segment at a time of depression of said reproduction button is
reproduced; and

when said frame candidate select button is depressed,
peripheries of a candidate frame designated at a time of depression
of said frame candidate select button are displayed on a frame
continuous display screen.

30.   A computer program for allowing a computer to execute
respective unit of a picture structure editing apparatus wherein
an appropriate data range in arranged data is defined as a segment
and, when the data range defined by one segment is expressed by

a group of a plurality of other segments, said group of the plurality of other segments is defined as a package, thereby editing a structure of said arranged data using structure information defining a hierarchical structure of said arranged data, said structure editing apparatus comprising:

first designating unit which designates an arbitrary segment in said structure information as a target segment;

second designating unit which designates an arbitrary position included in a range of said target segment; and

segment dividing unit which divides the range of said target segment into a first half segment and a second half segment at a dividing position, the dividing position being said position designated by said second designating unit.

31. A computer program for allowing a computer to execute respective unit of a picture structure editing apparatus wherein an arbitrary frame range in a picture stream is defined as a segment, and when the range designated by one segment is expressed by a group of a plurality of other segments, the group of said plurality of segments is defined as a package, thereby editing a structure of said picture stream using structure information defining a hierarchical structure of said picture stream, the picture structure editing apparatus comprising:

first designating unit which designates an arbitrary segment in said structure information as a target segment;

second designating unit which designates an arbitrary position included in a range of said target segment; and

segment dividing unit which divides the range of said target segment into a first half segment and a second half segment at a dividing position, the dividing position being said position designated by said second designating unit.

32. An object content structure management method for managing a content structure of an object, the content structure of the object expressed by a tree-structure set membership consisting of zero or at least one object, an attribute capable of being held by the object for each object type and the object type being defined by a schema definition, wherein

a list of child objects defined by said schema definition is managed for each said object, the child objects capable of being held by said object;

the list of said child objects holds instances of all objects actually existing as the child objects and objects which do not actually exist but can exist as the child objects, and each object holds determination information for determining whether a certain object is an instance of an actually existing object or an object which does not actually exist but can exist as a child object;

when an arbitrary object is set as a start object, a list of child objects of said start object, a list of the child objects of each object held by the list of the child objects, and a list

of child objects of each object held by a list of child objects
of the child objects are sequentially managed, thereby managing
a content structure of said start object.

5   33.   An object content structure management method according to
claim 32, wherein

the objects which do not actually exist but can exist as
the child objects are managed one by one for each object of a same
type.

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34.   An object content structure management method according to
claim 32, wherein

when a plurality of objects including an exclusively
selectable object exist in a plurality of types of objects capable
15   of being held by a certain object by a schema definition of the
object, said certain object manages said plurality of objects
including the exclusively selectable object as a choice list besides
said list of child objects;

when one object is selected from among a plurality of choices,
20   only the selected object is managed by a list of child objects of
a parent object and objects other than the selected object of the
choices are managed as the objects which do not actually exist but
can exist as child objects in the choice list of said selected object.

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35.　　An object content structure display method for displaying a content structure of an object, the content structure of the object expressed by a tree-structure set membership consisting of zero or at least one object, an attribute capable of being held by the object for each object type and the object type being defined by a schema definition, wherein

　　　　objects held by said object as child objects are expressed by a tree structure, a character string representing the object type is displayed on each node of the tree structure to display a structure of the object, a type and a value of the attribute capable of being held by an object selected from the displayed tree structure are displayed, thereby displaying a content and a structure of the selected object.

36.　　An object content structure display method according to claim 35, wherein

　　　　not only instance objects actually held by the object but also objects which are not held by the object but can be held based on the schema definition are simultaneously displayed in the tree structure one by one for each object type, and the instance objects and the objects other than the instance objects are discriminated by different icons, respectively and then displayed.

37. An object content structure display method according to claim
35, wherein

when there is a probability that objects likely to be held
by the object serving as a root further hold objects, said tree
5   structure is expressed hierarchically; and

when a displayed hierarchical level is designated at a time
of hierarchically displaying said tree structure, structures below
the actually existing instance objects are displayed up to the
designated hierarchical level and display of structures below the
10 designated hierarchical level is omitted.

38. An object content structure display method according to claim
35, wherein

when it is possible to hold any one of a plurality of types
15 of objects under a schema definition of types of child objects capable
of being held by the object, all objects of choices are displayed
in a tree structure as child nodes and the objects actually selected
and held among the choices and the unselected choices are
discriminated from each other by different icons, respectively and
20 then displayed.

39. An object content structure display method according to claim
35, wherein

when retrieval is indicated after designating the character
25 string representing the object type, all retrieved objects are

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highlighted.

40.   An object content structure display method according to claim 35, wherein

when it is possible to hold a plurality of child objects of a same type under a schema definition of types of the child objects capable of held by the object, one of a maximum number and a minimum number of the child objects capable of being held are displayed in said tree structure.

41.   An object content structure editing method for editing a content structure of an object, the content structure of the object expressed by a tree-structure set membership consisting of zero or at least one object, an attribute capable of being held by the object for each object type and the object type being defined by a schema definition, wherein

objects held by said object as child objects are expressed by a tree structure, a character string representing the object type is displayed on each node of the tree structure to display a structure of the object, a type and a value of an attribute capable of held by an object selected from the displayed tree structure are displayed, thereby displaying a content and a structure of the selected object; and

when a value to be changed is inputted and change is indicated for said displayed attribute value, the attribute value of the object

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is updated to the input value.

42.   An object content structure editing apparatus according to claim 41, wherein

when instance addition is indicated after one of the objects existing in the tree structure is designated, an instance object of the same type as a type of the designated object is created and the object of the same type is displayed as a fraternal node of said designated object in the tree structure.

43.   An object content structure editing method according to claim 42, wherein

the object permitted to be held as a plural and the object prohibited from being held as a plural by the schema definition are discriminated by different display colors or different icons, respectively and then displayed, instance addition indication for said object prohibited from being held as a plural is not accepted.

44.   An object content structure editing method according to claim 41, wherein

when addition is indicated after designating one dummy objects indicating types of objects which do not actually exist but can be held, said designated dummy object is changed to an actual instance and an icon of said designated dummy object is changed to an icon indicating the actual instance in the tree structure.

45.   An object content structure editing method according to claim 44, wherein

when not only said designated dummy object but also ancestor objects of said designated dummy object are dummy objects, the ancestor objects are sequentially changed to instances.

46.   An object content structure editing method according to claim 41, wherein

when deletion is indicated after designating the actually existing object and said designated object exists as a plural, then structures below the objects are deleted and display of the objects is deleted from the tree structure; and when the deletion is indicated after designating the actually existing object and said designated object is a single object, then nodes below the designated object are changed to dummy objects and display icons of the nodes in the tree structure are changed.

47.   An object content structure editing method according to claim 41, wherein

when selection change is indicated after one of dummy objects indicating unselected choices is designated, the objects selected before the selection change are changed to the objects indicating choices and said designated object is changed to a selected object.

48.   An object content structure editing method according to claim
41, wherein

edited object contents are outputted by a description
language, the description language being one of an MPEG-7 description
language or an XML description language.

49.   A computer program for allowing a computer to execute an
object content structure management method for managing a content
structure of an object, the content structure of the object expressed
by a tree-structure set membership consisting of zero or at least
one object, an attribute capable of being held by the object for
each object type and the object type being defined by a schema
definition, wherein

a list of child objects defined by said schema definition
is managed for each said object, the child objects capable of being
held by said object;

the list of said child objects holds instances of all objects
actually existing as the child objects and objects which do not
actually exist but can exist as the child objects, and each object
holds determination information for determining whether a certain
object is an instance of an actually existing object or an object
which does not actually exist but can exist as a child object;

when an arbitrary object is set as a start object, a list
of child objects of said start object, a list of the child objects
of each object held by the list of the child objects, and a list

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of child objects of each object held by a list of child objects of the child objects are sequentially managed, thereby managing a content structure of said start object.

5   50.   A computer program for allowing a computer to execute an object content structure display method for displaying a content structure of an object, the content structure of the object expressed by a tree-structure set membership consisting of zero or at least one object, an attribute capable of being held by the object for

10   each object type and the object type being defined by a schema definition, wherein

objects held by said object as child objects are expressed by a tree structure, a character string representing the object type is displayed on each node of the tree structure to display

15   a structure of the object, a type and a value of the attribute capable of being held by an object selected from the displayed tree structure are displayed, thereby displaying a content and a structure of the selected object.

20   51.   A computer program for allowing a computer to execute an object content structure editing method for editing a content structure of an object, the content structure of the object expressed by a tree-structure set membership consisting of zero or at least one object, an attribute capable of being held by the object for

25   each object type and the object type being defined by a schema

definition, wherein

objects held by said object as child objects are expressed by a tree structure, a character string representing the object type is displayed on each node of the tree structure to display a structure of the object, a type and a value of an attribute capable of held by an object selected from the displayed tree structure are displayed, thereby displaying a content and a structure of the selected object; and

when a value to be changed is inputted and change is indicated for said displayed attribute value, the attribute value of the object is updated to the input value.

52.   A content management method capable of managing one content by a plurality of data formats, wherein

data of an original content consisting of one or a plurality of files and a plurality of items of data expressed in a data format different from a data format of the data of the original content are integrated into one logical content and collectively managed.

53.   A content management method according to claim 52, wherein

when a content is one of picture data and voice data, then the files of the original contents, a file in a data format suited for a processing or a file registered in response to a user's request are collectively managed.

54.   A content management method according to claim 53, wherein after registering the original contents, a file in a data format suited for a processing requested in response to a processing request for specifying a logical content is created or files in a plurality of data formats assumed in advance are automatically created at free timing.

55.   A content management method according to claim 53, wherein said processing is one of a data editing operation, a content description operation and a delivery operation.

56.   A content management method according to claim 55, wherein after registering the original contents, a file in a data format suited for a processing requested in response to a processing request for specifying a logical content is created or files in a plurality of data formats assumed in advance are automatically created at free timing.

57.   A content management method according to claim 52, wherein when the original contents are constituted out of a plurality of items of data, management information for managing an allocation position and an allocation length of each data for allocating each data to the logical content consisting of the plurality of items of data of the original content is provided, the management information as well as the files being collectively managed.

58.   A content management method according to claim 57, wherein
each data of the original content constituting said logical
content is a part of one file or has an overlapped content
between the data of the original content.

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59.   A content management method according to claim 52, wherein
an attribute of a content is described as content description
information indicating the content.

10 60.   A content management method according to claim 59, wherein
the content description information has a logical structure.

61.   A content management method according to claim 52, wherein
the content description information indicating the content is
15 included as data to be collectively managed.

62.   A content management method according to claim 52, wherein
the content description information having a logical structure is
included as data to be collectively managed.

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63.   A computer program for executing a content management method
capable of managing one content by a plurality of data formats,
wherein

data of an original content consisting of one or a plurality
25 of files and a plurality of items of data expressed in a data format

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different from a data format of the data of the original content
are integrated into one logical content and collectively managed.